Housing for gas-treating components, panel and method for manufacturing such a housing

The invention relates to a housing for gas-treating components, comprising: a body formed by a plurality of panels and provided with a receiving space for the gas-treating components, and at least one feed respectively discharge for gas connecting onto the receiving space. The invention also relates to a panel for use in such a housing. The invention further relates to a method for manufacturing at least a part of such a housing.

The housing for gas-treating components referred to in the preamble has been known for a long time. Such housings are usually referred to on the market as air treatment boxes and are generally employed to condition a local atmosphere in a space. The known housings are made of metal and comprise a metal frame to which a plurality of metal panels are fixed. The panels enclose a receiving space for electromechanical components. Examples of usual components placed in the housing are: fans for active displacement of gas, cooling and heating units for cooling and heating gas, filters for cleaning (contaminated) gas and moisture-regulating units for adding moisture to or removing it from gas. The known metal air treatment boxes have a number of drawbacks. A first drawback of the known housing is that it is relatively heavy. In addition, it is generally found to be relatively difficult to construct and install the frame (to be welded) on site, whereby assembly generally takes place off site. A third drawback of the known housing is that, when an electromechanical component arranged in the housing malfunctions, the (conductive) metal housing can become electrically charged, which is usually undesirable from a safety viewpoint. In addition, the known housing generally requires a relatively high level of maintenance, inter alia because of oxidation and the like, while the lifespan is relatively short.

The invention has for its object to provide an improved housing for gas-treating components which does not have the above stated drawbacks.

The invention provides for this purpose a housing of the type stated in the preamble, characterized in that the panels are manufactured at least partially from plastic. Application of plastic panels in a housing according to the invention has a number of advantages. A first advantage is that plastic has a relatively low density, which can

result in reduction of transport costs in transporting of the panels, as well as facilitating installation of the housing. In addition, the plastic panels require relatively little or even no maintenance, while the lifespan is increased considerably when compared to metal panels. Plastic moreover usually has the characteristic of being more sound-insulating than metal, whereby sound production from the components arranged in the housing that is discernible outside the housing can be considerably reduced. An additional advantage of the plastic panels is that they can generally be made to size on site, this in contrast to the known metal panels. In addition to the above stated advantages it is also possible, in the case the plastic is of a recyclable or even biodegradable nature, to obtain a housing which has a relatively small environmental impact compared to the known conventional metal housing.

The housing is preferably provided with a plurality of profiles for mutual fixing of a plurality of adjacent panels. The profiles can herein be formed by for instance angle profiles for fixing two adjacent panels which are at least substantially perpendicular to each other, as well as by for instance T-profiles or H-profiles for fixing two panels lying in the same plane. In preference the profiles enclosing a panel herein at least substantially make contact with each other. In order to reduce the total mass of the housing, the profiles are manufactured in a particular preferred embodiment from plastic, in particular from fibre-reinforced plastic. The manufacture of the profiles from plastic also allows wide scope for making the profiles to size, whereby on site assembly of the housing according to the invention is made possible. In addition, the use of plastic profiles provides a housing which is at least substantially fully recyclable, whereby the (plastic) housing is therefore relatively environmentally-friendly.

In a preferred embodiment an adhesive is applied between adjacent panels for mutual fixing of the panels. Use of the adhesive generally results in a sturdy connection of two adjacent panels, wherein additional (mechanical) fixing elements are not usually required. The adhesive is preferably applied in combination with the above stated profiles. A fully self-supporting housing can thus be obtained. In a particular preferred embodiment the adhesive comprises mastic. In addition to an adhesive action, mastic also has a sealing and filling action. As well as a housing that is relatively robust, a housing can also be obtained which is relatively sound-insulating. An additional advantage is that the sealing and filling action of the mastic prevents, or at least

counters, the growth of fungi, bacteria and yeasts in micro-spaces enclosed by the panels.

At least one panel is preferably provided with a closable opening connecting onto the receiving space for the purpose of carrying out operations in the receiving space. The opening is herein preferably closed by a cover element (pivotally) connected to the panel. Both the opening and the cover element can be formed in simple manner from the same panel, this in contrast to the forming of a cover element and corresponding opening in a conventional metal panel.

In another preferred embodiment at least a part of the panels has a laminar structure, wherein at least one first laminate layer forming part of the panel of laminar structure is manufactured from plastic. By giving the panel a laminated structure a panel can be obtained, by assembling materials, which has a number of favourable characteristics, including among others being sound-insulating and heat-insulating, rigid, lightweight and non-conductive. In a particular preferred embodiment at least one second laminate layer forming part of the panel of laminar structure is provided with wood. Wood gives the panel, among other things, a relatively great rigidity. The wood layer moreover functions generally as fixing layer for (mechanical) fixing of for instance an electromechanical gas-treating component to the panel. In another particular embodiment at least one third laminate layer forming part of the panel of laminar structure is manufactured from a sound-insulating material. The sound-insulating material can for instance be formed by polyurethane foam (PUR foam) or by foam rubber.

The invention also relates to a panel for use in such a housing. Advantages of the panel according to the invention have already been described above.

The invention further relates to a method for manufacturing at least a part of such a housing, comprising the steps of: A) heating at least a part of each of at least two panels, B) allowing the heated parts of the panels to mutually adhere while forming at least a part of the receiving space, and C) allowing the heated parts of the panels to cool. An example of a type of material from which the panels can be manufactured so that they can be welded is (foamed) polypropylene. The method can optionally be repeated until the whole receiving space has been made. The panels can be fixed to each other by

heating the panels until they are (almost) liquid. The method is preferably also provided with step D), comprising of arranging a heated welding agent in at least a part of a seam formed by the panels, this during or after allowing the heated parts of the panels to adhere to each other while forming at least a part of the receiving space as according to step B. The welding agent is preferably applied immediately after the panels have been allowed to engage on each other. Applying the welding agent generally results in an improved, relatively durable and firm connection of the panels. The welding agent can optionally be heated by for instance a hot air blower when being introduced into the seam between the panels, in order to facilitate handling of the welding agent. The welding agent is preferably pressed into the seam via an assist means during or (just) after performing step D) so as to consolidate the mutual adhesion of the panels. A welding agent suitable for realizing a strong mutual fixing of the panels is for instance a flux-cored wire manufactured from polyphenyl sulphide.

The invention will be further elucidated with reference to non-limitative embodiments shown in the following figures. In the drawing:
figure 1 shows a perspective view of an embodiment of an air treatment box according to the invention,
figure 2 shows a detailed cross-section of a part of the air treatment box according to figure 1, and
figure 3 shows a detailed cross-section of a part of another air treatment box according to the invention.

Figure 1 shows a perspective view of an embodiment of an air treatment box 1 according to the invention. Air treatment box 1 comprises a plastic, in particular (glass) fibre-reinforced plastic, frame 2 and laminated panels 3 connected to frame 2. Frame 2 is constructed from an assembly of angle profiles 4 and H-profiles 5. Air treatment box 1 is provided with an inlet 6 and an outlet (not shown) for air, wherein the direction of the air displacement is indicated by means of arrows. An air treatment unit (not shown) is positioned in air treatment box 1. In order to increase the accessibility to the air treatment unit, one panel 3 is provided with an opening 8 closable by a cover element 7. Cover element 7 is connected in pivotal manner to panel 3 and is provided with a rubber seal 9, which seal 9 also functions as sound and heat-insulating element. Cover element 7 is provided with a handle 10 to facilitate opening and closing of opening 8. H-profiles

5 are arranged for the purpose of mutually connecting two adjacent panels 3. In another embodiment use can be made of panels of a larger size, whereby H-profiles 5 are no longer required. Air treatment box 1 is provided with four supports 11 in order to minimize the radiation of sound to and resonance with a ground surface supporting air treatment box 1. Panels 3 are provided with a plurality of material layers, three of which material layers are manufactured from plastic and two of which material layers are manufactured from wood. The shown air treatment box 1 has a number of advantages; air treatment box 1 has for instance a low density, has a modular structure and can therefore be mounted on site in simple manner, and is manufactured inter alia from plastic such as (foamed) polypropylene, whereby components forming part of air treatment box 1 can be made to size (on site) in simple manner. Furthermore, the shown air treatment box 1 requires little maintenance, insulates against sound, heat and electricity and is maintenance-friendly. Further advantages have already been described above.

Figure 2 shows a detailed cross-section of a part of air treatment box 1 according to figure 1. Figure 2 shows clearly the adhesion of two adjacent panels 3 via a mastic layer 12. The mutual fixing of the two panels 3 is strengthened by an angle profile 4 engaging on panels 3. Mastic layer 12 is also applied between angle profile 4 and the two panels 3. The mastic layer 12 strengthens the construction of air treatment box 1. Panels 3 are however preferably provided with a primer (undercoat) before mastic layer 12 is applied, so as to improve the mutual adhesion of panels 3. Other advantages of the mastic layer have already been described above. Figure 2 shows clearly that each panel 3 is constructed from a symmetrical assembly of five material layers 13. Panel 3 is provided with a foam plastic core 14, two wood layers 15 enclosing the foam core and two plastic cover layers 16 enclosing wood layers 15. Foam core 14 in particular has an insulating function. Wood layer 15 particularly ensures the rigidity of panel 3. Wood layer 15 herein functions generally as stable carrier for mechanical fixing means, such as for instance screws, forming part of the air treatment unit. The plastic cover layer 16 protects wood layer 16 and considerably reduces the necessary maintenance of panel 3. It should be apparent that other variants can also be applied in addition to the shown construction. It is thus possible for instance to envisage providing the panels 3 close to the contact sides with a mitre joint of for instance 45°-45° or 30°-60°, whereby the contact surface between the two panels 3 can be increased, which can generally enhance

the strength of the construction of air treatment box 1.

Figure 3 shows a detailed cross-section of a part of another air treatment box 17 according to the invention. Similarly to figure 1, air treatment box 17 is constructed from a plurality of mutually connected panels 18. In contrast to figures 1 and 2 however, panels 18 are now not glued to each other but welded to each other. For this purpose the panels 18 are partially heated until these parts are (almost) liquid, or are at least soft and deformable. These parts of each panel 18 which have become soft are further pressed onto each other, whereby a certain degree of fusion, flowing together or at least mutual adhesion of the two panels 18 is realized. In order to improve this mutual adhesion, use is made in the shown embodiment of a flux-cored wire 19. The (also heated) flux-cored wire 19 is arranged just after the two (partially soft) panels 18 have been pressed together. Flux-cored wire 19 is preferably manufactured here from polyphenyl sulphide. This flux-cored wire 19 engages on both panels 18 and in the heated soft state is forced using an assist means partly into a seam 20 formed by panels 18. During arranging of flux-cored wire 19 on the two panels 18 the flux-cored wire 19 is heated, for instance using a hot air blower, so as to facilitate handling of flux-cored wire 19. During arranging of the (almost) liquid flux-cored wire 19 on the soft parts of the two panels 18, a fusion of panels 18 and flux-cored wire 19 will usually be realized, whereby a relatively strong, durable and firm connection can be ensured.

It will be apparent that the invention is not limited to the embodiments shown and described here, but that within the scope of the appended claims a large number of variants are possible which will be obvious to the skilled person in the field.